



# ***Paperless Aircraft Operations***

## ***IATA Business Case Support***



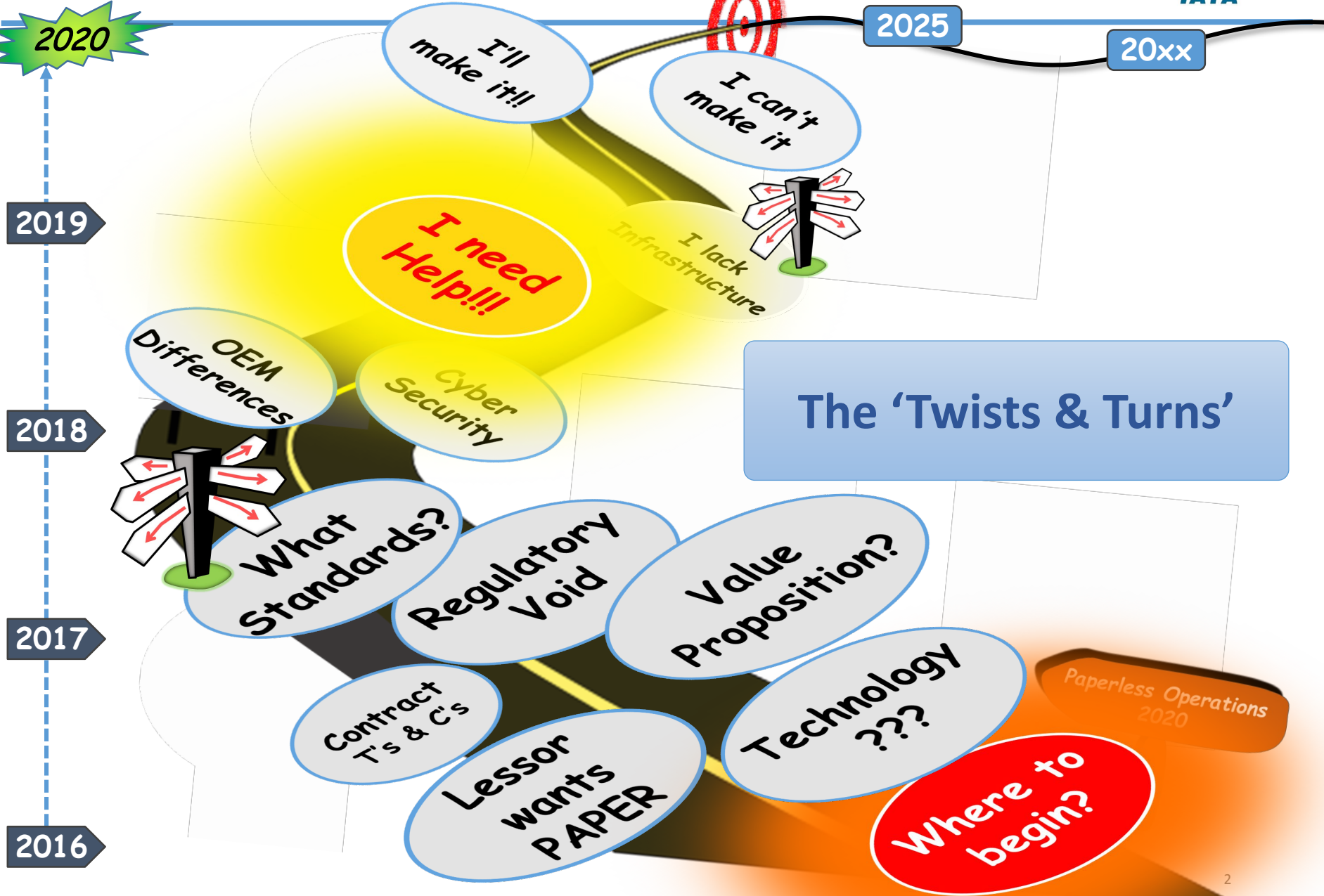
**Paperless Aircraft Operations  
and RFID Conference**

Cranfield University Cranfield, UK  
November 26-27 2018



**David Edwards**  
IATA - Senior Consultant

# Recap... last few years



# Cross-Functional Working Groups



Monthly conference calls organised by time zones...

You too can participate & contribute to the industry's PAO:TO development...



# Review... Precedent work



Guidance Material  
for the implementation of  
Paperless Aircraft Operations  
in  
Technical Operations  
(PAO:TO)

Release 1  
November 2017

Consider these four questions.

*Do you want to save costs in the longer term?*

*Do you want to efficiently transfer assets – aircraft, engines, components?*

*Do you want to facilitate 100% configuration and airworthiness compliance?*

*Do you want to build & optimize your organization's knowledge management?*

**Paperless Operations can facilitate these...**

## Regulatory-based "Checklist"

Assists you in gaining your CAA's approval for your PAO:TO  
Adapted from FAA, TC, CASA, & EASA advisory material

Enter Key Word		OR		Select Key Word from Key Word List (Use drop down menu)							
<input type="text"/>	<input type="button" value="Add Keyword"/>	<input type="text"/>	<input type="button" value="Go To Keyword List"/>	<input type="text"/>	<input type="button" value="search"/>						
FAA	TCCA	CASA	EASA								
<b>#Signature - Responsible Personnel - Integrity &amp; Security of Process &amp; System</b> Question: Do policies and procedures identify the certificate holder's personnel who have the authority and overall responsibility for the integrity and security of the electronic signature process and for controlling access to the computer software/application used in the process?	<b>Data integrity and accuracy - of data certified</b> Question: Can 'organisation' ensure integrity and accuracy of the data certified by the signature on the ARC Form One and be able to show evidence of the authenticity of the ARC with suitable security safeguards and backups?	<b>Electronic Transactions Act - Integrity</b> Information: 'Integrity' - The information contained in the communication must remain its integrity. This means the information must remain complete and unaltered (apart from the addition of an endorsement, or any immaterial change arising in the normal course of communication, storage or display). This may include, for example, information added to the communication that is necessary to identify the message for storage purposes.	<b>#System Integrity &amp; Accuracy</b> Question: Does the electronic system ensure integrity and accuracy of the data certified by the signature of the EASA Form 1 (recording and record keeping) with suitable security, safeguards and backups?								
select to compare	FAA Heading Match	FAA Cell Link	select to compare	TCCA Heading Match	TCCA Cell Link	select to compare	CASA Heading Match	CASA Cell Link	select to compare	EASA Heading Match	EASA Cell Link
<input type="checkbox"/>	#Signature Standards - Preserving integrity of Signed Record	FAA Link	<input checked="" type="checkbox"/>	Data integrity and accuracy of data certified	TCCA Link	<input checked="" type="checkbox"/>	Electronic Transactions Act - Integrity	CASA Link	<input checked="" type="checkbox"/>	#System Integrity & Accuracy	EASA Link
<input checked="" type="checkbox"/>	#Signature - responsible personnel - integrity & security of process & system	FAA Link	<input type="checkbox"/>	Description - signature - verification of Data Source & Integrity	TCCA Link	<input type="checkbox"/>	Annexes of e-Systems - Data Integrity	CASA Link	<input type="checkbox"/>	#Signature Cryptography	EASA Link
<input type="checkbox"/>	#Records - Description	FAA Link	<input type="checkbox"/>			<input type="checkbox"/>	Security - Exposure & Procedures	CASA Link	<input type="checkbox"/>	#Signature Policy & Management Structure	EASA Link
<input type="checkbox"/>	#Recordkeeping - Quality Control (QC) - Audit - Computer System	FAA Link	<input type="checkbox"/>			<input type="checkbox"/>	Security	CASA Link	<input type="checkbox"/>		
<input type="checkbox"/>	#Recordkeeping - Training and User Instructions - Security awareness	FAA Link	<input type="checkbox"/>			<input type="checkbox"/>			<input type="checkbox"/>		
<input type="checkbox"/>	#Recordkeeping - Transferring Data - To New System	FAA Link	<input type="checkbox"/>			<input type="checkbox"/>			<input type="checkbox"/>		
<input type="checkbox"/>	#Recordkeeping - response Personnel - Integrity & Security of System	FAA Link	<input type="checkbox"/>			<input type="checkbox"/>			<input type="checkbox"/>		
<input type="checkbox"/>	#Recordkeeping - Audit Procedures - Record Quality & Integrity	FAA Link	<input type="checkbox"/>			<input type="checkbox"/>			<input type="checkbox"/>		

Page 1

# Business Case Support Template

## Principles

To develop PAO:TO Business Case support material for use by industry

To utilize precedent material and to engage with key stakeholders via the PAO:TO working groups

To identify Business Case key elements

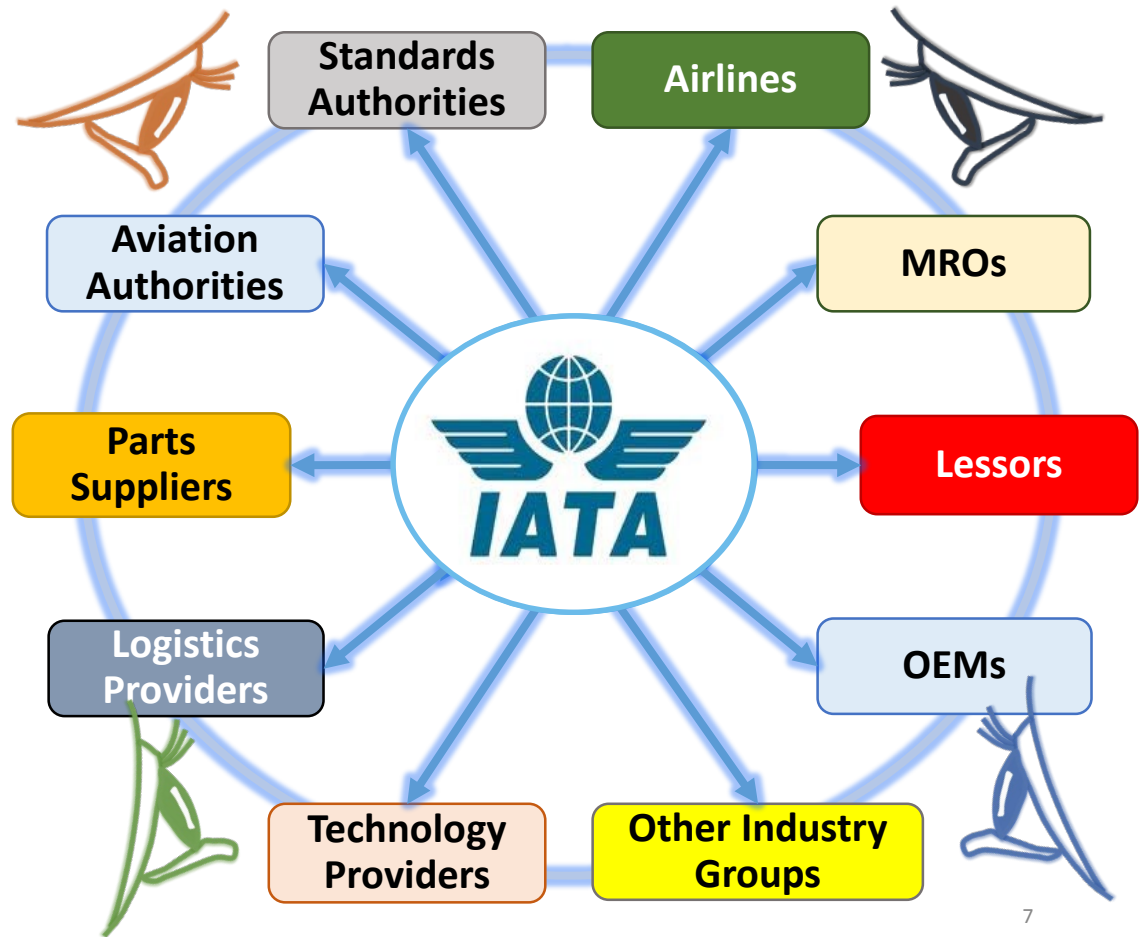
To finalize the approach and publish initial release



Informed by precedent 'Guidance Material'

Stakeholder working group members provided input

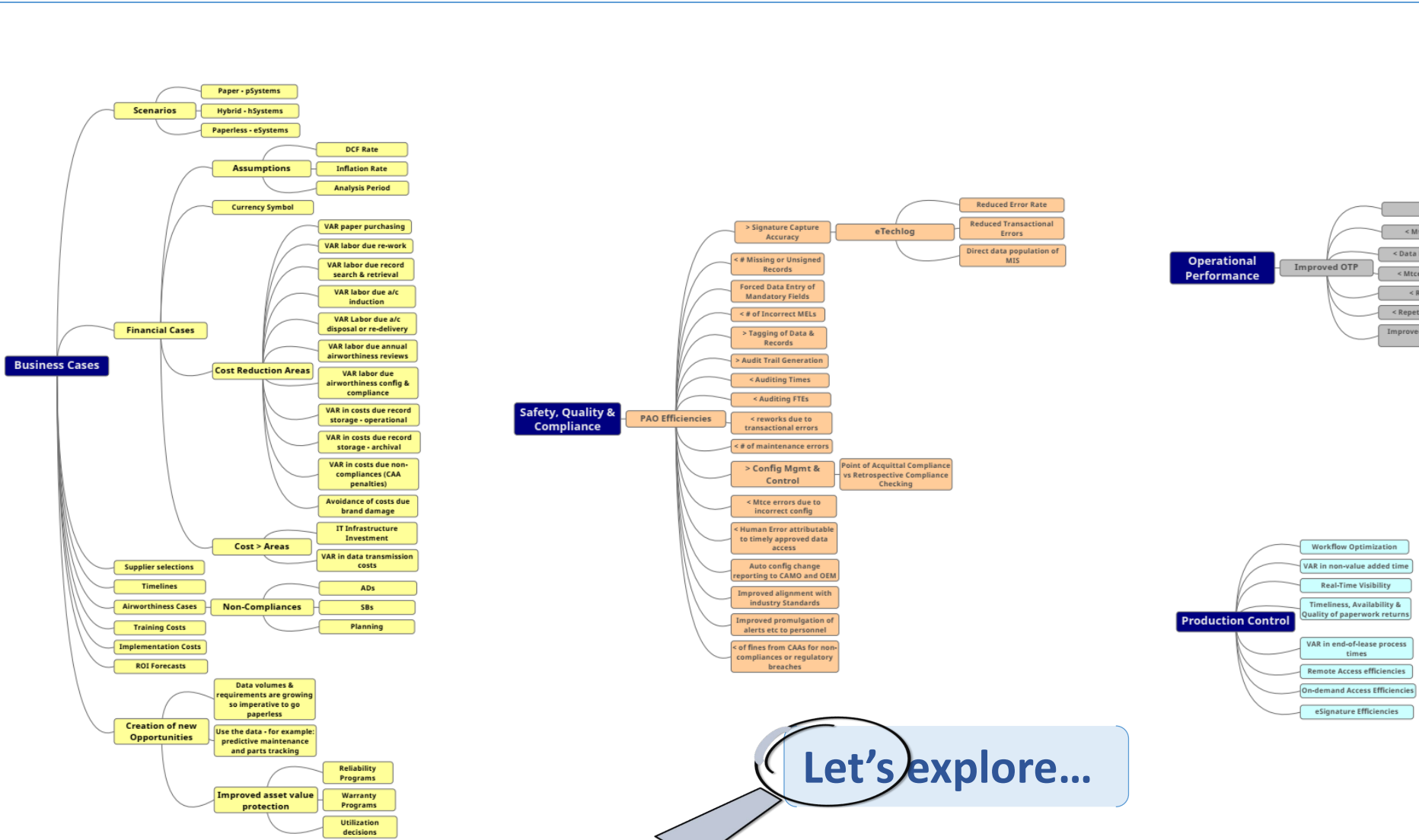
Each Stakeholder viewed the requirements from a slightly different perspective



# The 'Perspectives' were many and varied



## Captured within a comprehensive MindMap...



Let's explore...



Looking one of these in more detail...

**Business Cases**

**Safety, Quality & Compliance**

**OEM**

**Stakeholders**

**Operational Performance**

**Production Control**

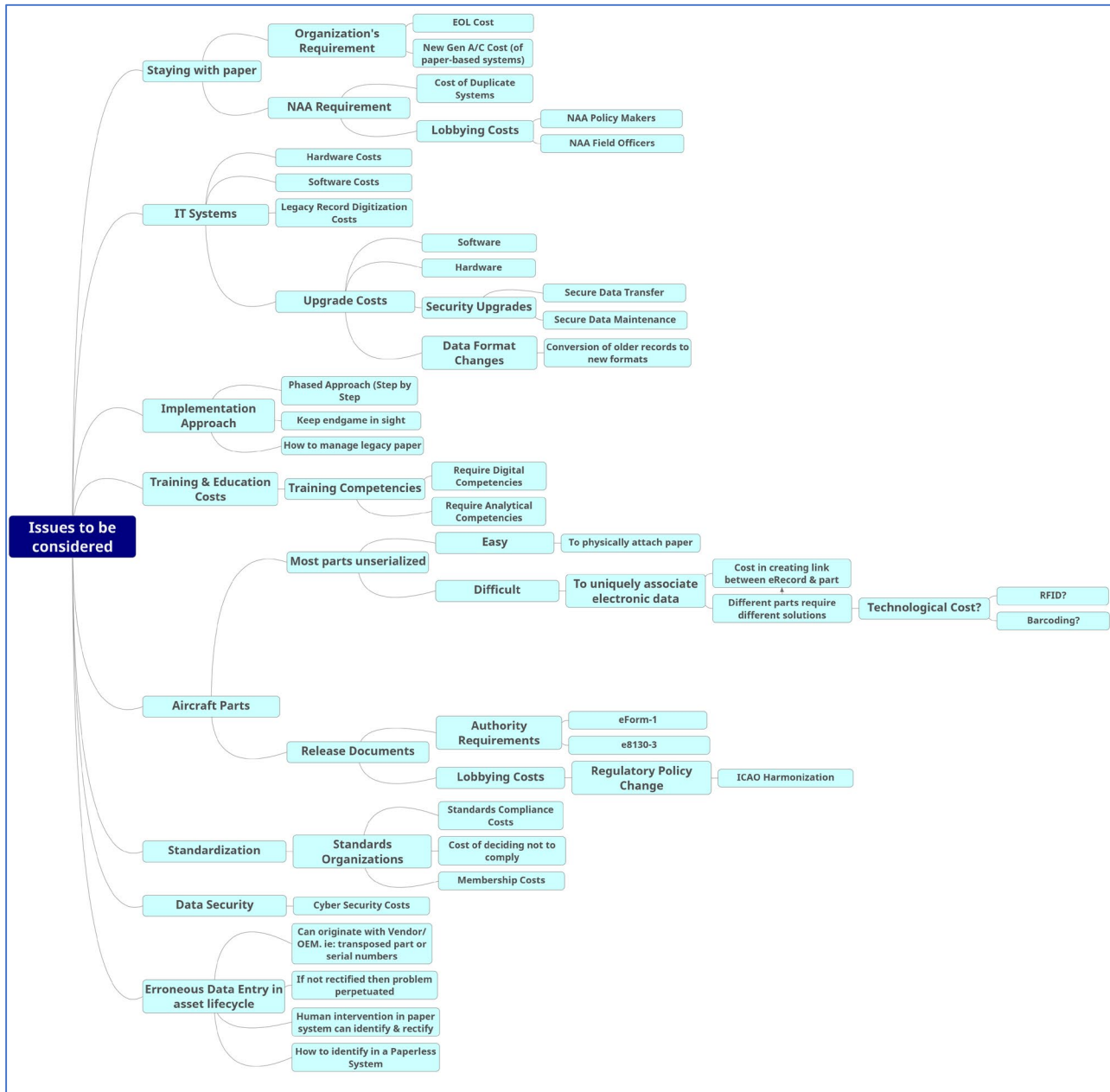
**Warranty**

**Leasing**

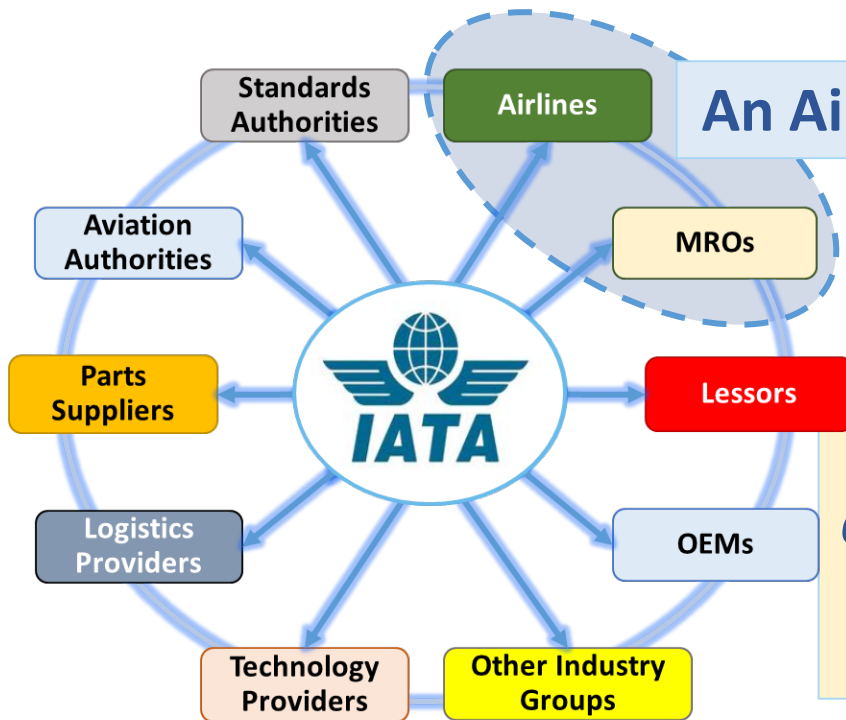
**Legacy Paper Records**

**Issues to be considered**

# MindMap Node – Issues to be considered



An all-encompassing business case would be very complex - so...



An Airline/MRO perspective was adopted

*However...  
Other stakeholders from within the working groups have said they can make good use of the template...*

*The MindMap is available for download should you wish to consider other elements within your business case.*

# Overview

# Business Case Support Template

# Overview Business Case Support Template



**Developed** to assist you in the building of your business case for PAO:TO implementation

A **comprehensive** *excel workbook*

**Input** of your data and your assumptions is required

It **calculates** the cost and the FTE numbers within various categories - based on **your inputs**

**Guidance** notes are provided throughout the template

**Output** tables and sample graphs are generated for you to apply within your business case

**Systems-Based** scenarios were used in the Template development

<b>pSystems (Paper)</b>
<b>hSystems (Hybrid)</b>
<b>eSystems (Paperless)</b>

**Paper-based** systems (*assumed baseline*)

**Hybrid** Systems (*smart digitizing in use*)

**Paperless** Systems (*e-Business*)

**Any** of these systems - regardless of aircraft generation (age)?

The **baseline** case in the template is assumed to be pSystems

If progressing towards eSystems, hSystems **could be** your baseline case

How to Use

IATA Disclaimer

Inputs\_SetUp

Inputs\_Salaries

Inputs\_M&ELocations

Inputs\_FleetMix

Inputs\_RecordsGeneration

Costs\_Records

- How to Use

- IATA Disclaimer

- Inputs – Setup
- Inputs – Salaries
- Inputs – M&E Locations
- Inputs – Fleet Mix
- Inputs – Records Generation

- Costs – Records Other
- Costs – Records Archive & Retrieval
- Costs – Labor Record Error Rework
- Costs – Labor Aircraft Lessee
- Costs – Labor Warranty

- Costs – IT
- Costs – Training
- FTE & Systems Efficiencies

- Outputs – Cashflow Tables; pSystems, hSystems & eSystems
- Outputs – Systems Cost Graphs
- Outputs – FTE Summary Graphs
- Outputs – Systems Efficiency Costs

- Excel Name Manager Guide

Outputs - SystemCostsGraphs

Outputs - FTESummaryGraphs

# Template Cell Colour Coding




Key	
	Blue: data entry (unlocked)
	Yellow: Information & Derived Results (locked)
	Green: Derived results appear on cash flow statements
	Red corner: comment.
<b>H</b>	Bold green: Assigned name for adjacent cell or range
<b>D</b>	Grey Text: Paper-based Systems Inputs
<b>H</b>	Blue Text: Hybrid Systems Inputs
<b>P</b>	Maroon Text: Paperless Systems Inputs

The Blue data entry cells are the important ones for you. This is where you enter **your** data and from which the Template calculations are derived



## Column A - Information

Guidance notes are provided throughout the Template workbook

	Column A - Information
	<p style="text-align: center;"><b>Note</b></p> <p>Column A throughout this "<b>example</b>" Template provides explanatory information.</p> <p style="text-align: center;">You may choose to delete this column in your working template</p>
	<p><b>Typical Business Units</b></p> <p>If you change the names of these business units then you need to change names within Name Manager (see 'Excel Name Manager Guidance' tab and note caution within).</p> <p>If you outsource HM, EM, CM, etc, you may consider data entry for these business units as zeros</p>
	<p><b>Paid Hour Calculations</b></p> <p>Enter normal hours per FTE. The 2080 in this example is comprised of 40hrs pw x 52wks pa. Adjust for each Business Unit (BU) in your analysis. Eg; the standard working week may vary between 25 and 40 hrs pw.</p>



# How to proceed



**Download** and save your own version

**Start** at the left-hand tab and work to the right

**Replace** example data with **your data**

**Category not applicable?** - leave it blank or enter zeros

**Experiment** – to begin use ROM data and use assumptions

**Don't underestimate** the effort required

**Outputs don't look right** - review your data and assumptions (*you may get an 'aha' moment!*)

**Determine outputs** required for calculation of DCF/NPV etc for your business case, and which supporting graphs are needed

## Records Generation

- Per aircraft
- Per fleet
- Per department
- % paper records

## Records – Non Labor

- Outsource processing
- Paper stock purchase
- Paper book purchase
- MFD leasing
- MFD printing
- Print room space
- Filing cabinet space
- Compactus space

## Archive & Retrieval

- Archive costs
- Retrieval costs
- Record shred rates
- Per department

## Rework Labor Cost

- Error rates
- Rework labor hours
- Rework labor cost
- Rework FTEs

## Lessee Costs Labor

- Lessor hosting
- Disputed records
- Record search
- Due diligence
- Printing & Collation
- Related labor costs
- Related FTEs

## Warranty Labor Cost

- Claim preparation
- Claim follow-up
- Claim disputes
- Record loss
- Related labor costs
- Related FTEs

## IT Systems *(your data)*

### *Example systems*

- Maintenance Information
- Document Management
- SCL Management
- Mobility
- eTechLog

### *Cost Categories*

- Annual Operating
- Annual Licence
- Annual Software
- Annual Upgrade
- Annual Customization

## Training Costs

### *For system used*

- Training cost per FTE
- Per department
- % FTEs trained pa
- Implementation
- Continuation
- Worst case
- Best case
- Most likely

## System Efficiencies

### *Your assumptions*

- FTE % reductions
- p, to h, to eSystems
- Per department
- Worst case
- Best case
- Most likely

# Data Input & Calculation



Enter Data in Blue Cells

500
1,000
3,000
1,000
1,500
100
100
0
0
0
0
0
0

Derived Results in Yellow Cells

\$	108,231	\$
\$	270,579	\$
\$	730,562	\$
\$	229,992	\$
\$	202,934	\$
\$	16,235	\$
\$	20,293	\$
\$	-	\$
\$	-	\$
\$	-	\$
\$	-	\$
\$	-	\$
\$	1,578,826	\$

Cost Summary per sheet

Scenario 1: Paper-Based (pSystems) Lessee Cost Summary		
pSystems Lease Return Total Cost pa	\$	(1,578,826) \$
pSystems Lease Lessor Visit Total Cost pa	\$	(194,817) \$
pSystems Lease Disputed Record Total Cost pa	\$	(202,934) \$
pSystems Lease Record Search Total Cost pa	\$	(365,281) \$
pSystems Lease Due Diligence Total Cost pa	\$	(1,217,603) \$
pSystems Lease Paper Print Cost	\$	(48,900) \$
pSystems Lease Printing & Collation Total Cost pa	\$	(135,289) \$
<b>pSystems Induced Cost - Lessee Related</b>	<b>\$</b>	<b>(3,743,650) \$</b>

FTE Summary per sheet

pSystems (Paper) Lease Related FTEs		
pSystems Lease Return Total FTEs		14
pSystems Lease Lessor Visit Total FTEs		2
pSystems Lease Disputed Record Total FTEs		2
pSystems Lease Record Search Total FTEs		4
pSystems Lease Due Dilligence Total FTEs		12
pSystems Lease Return Print & Collate Total FTEs		2
<b>pSystems Lease Related FTEs TOTAL</b>		<b>35</b>

# Output Examples – Cost Tables & Graphs



Cost Summary per sheet

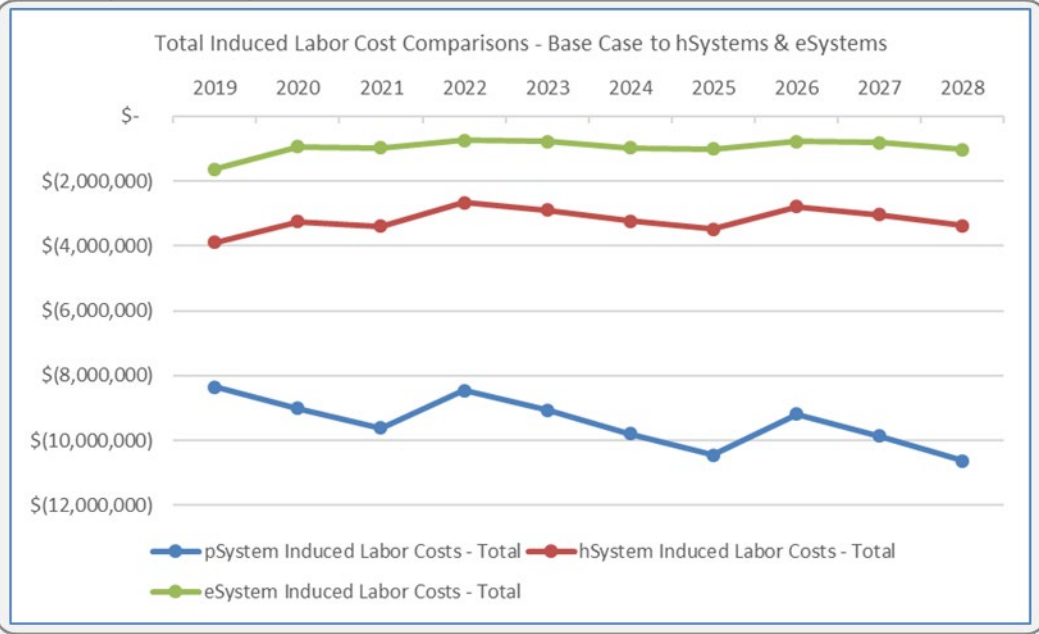
Scenario 1: Paper-Based (pSystems) Lessee Cost Summary		
pSystems Lease Return Total Cost pa	\$	(1,578,826)
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Systems Lease Record Search Total Cost pa	\$	(365,293)
Systems Lease Due Diligence Total Cost pa	\$	(1,217,603)
Systems Lease Paper Print Cost	\$	(48,900)
pSystems Lease Printing & Collation Total Cost pa	\$	(135,299)
<b>pSystems Induced Cost - Lessee Related</b>	<b>\$</b>	<b>(3,743,650)</b>



US\$ in 1000s	Yr 1 ending 31 Dec 2019	Yr 2 ending 31 Dec 2020	Yr 3 end 31 Dec 2021
<b>pSystems Cost of Labor - Base Case</b>	<b>\$ (379,378,750)</b>	<b>\$ (386,966,325)</b>	<b>\$ (394,100,000)</b>
<b>pSystems Cost of Labor - Net of Induced Labor Costs</b>	<b>\$ (371,016,881)</b>	<b>\$ (377,953,959)</b>	<b>\$ (385,600,000)</b>



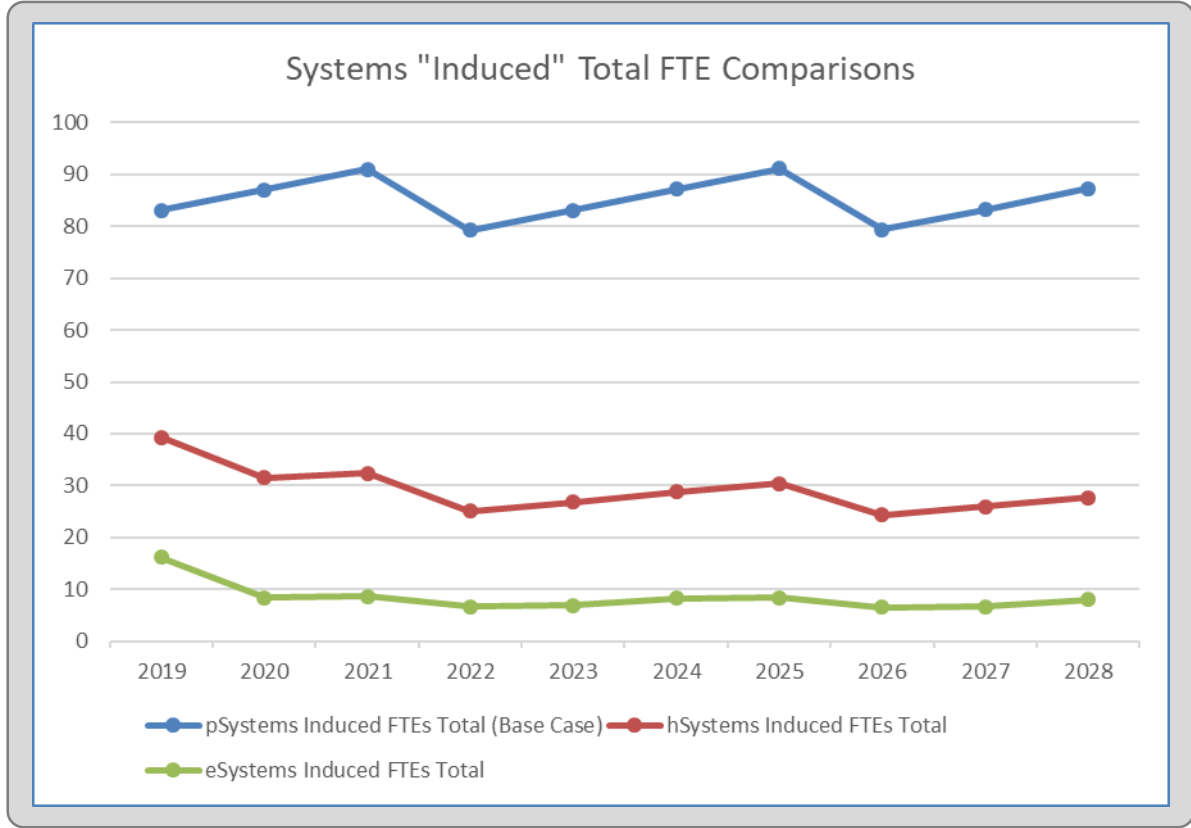
<b>pSystem Induced Labor Costs</b>		
pSystems Induced Labor Cost - Records Rework	\$	(3,947,005)
pSystems Induced Cost - Lessee Related	\$	(3,743,650)
pSystems Labor Cost - Warranty Related	\$	(607,828)
<b>pSystem Induced Labor Costs - Total</b>	<b>\$</b>	<b>(8,361,869)</b>
<b>pSystems Induced Records Costs</b>		
Outsourced Paper Records Processing Cost	\$	(2,360,222)
Copy Paper Purchase Costs	\$	(214,566)
Paper 'Book' Purchase Costs	\$	(547,056)
MFD Total Costs	\$	(1,074,426)
Office Space Leasing Cost	\$	(247,500)
<b>pSystems Induced Records Costs - Total</b>	<b>\$</b>	<b>(4,443,769)</b>
<b>pSystems Induced Archiving &amp; Retrieval Costs</b>		
pSystem Induced Costs - Archiving & Retrieval	\$	(63,386)
<b>pSystems Induced Training Costs</b>		
pSystems Induced Training Cost - Total	\$	(313,000)
<b>pSystems Induced IT Costs</b>		
pSystems Induced IT Costs - Total	\$	(39,450,000)
<b>pSystems Total Induced Costs</b>	<b>\$</b>	<b>(52,632,024)</b>
<b>pSystems Induced Costs Cumulative Cash Flow</b>	<b>\$</b>	<b>(52,632,024)</b>



# Output Examples – FTE Graphs

**FTE Summary per sheet**

pSystems (Paper) Lease Related FTEs	
pSystems Lease Return Total FTEs	14
pSystems Lease Lessor Visit Total FTEs	2
pSystems Lease Disputed Record Total FTEs	2
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pSystems Lease Due Diligence Total FTEs	12
pSystems Lease Return Print & Collate Total FTEs	2
<b>pSystems Lease Related FTEs TOTAL</b>	<b>35</b>





## Your next steps

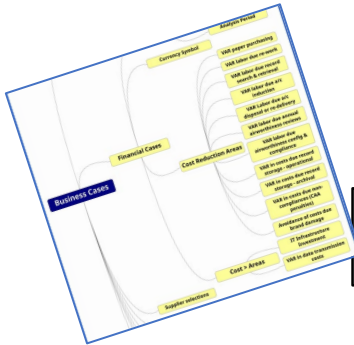
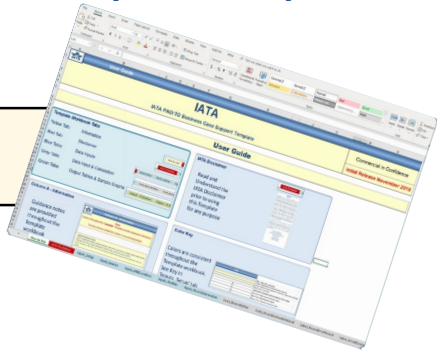


- The next steps are in **YOUR** hands as the end-user of this Template
- There are **many** formats & requirements for Business Cases
- **Determine** how your Template results are utilized
- Your **finance department** may need to apply DCF or NPV calculations to output tables for your business case
- **FTE** Summary Tables & Sample Graphs are provided. You may choose to use these to support your business case
- **Other Material** - Consider using or referencing precedent IATA material and the business case development mind map



IATA is developing a suite of tools to assist you in your PAO:TO journey

## Business Case Support Template



## Business Case Development MindMap

## Guidelines for Implementation of PAO:TO



## Regulatory-based Checklist

# Where to get it...



<http://www.iata.org/whatwedo/ops-infra/pages/paperless-ops.aspx>

Scroll down page to **Downloads**, and click to download:

## Downloads

### Template

➤ Paperless Aircraft Operations: Business Case Support Template,

### MindMap

➤ Paperless Aircraft Operations: Business Case Support Mindmap,

### Guidance

➤ IATA Guidance Material for the implementation of Paperless Aircraft Operations

- IATA Master Engine Maintenance Agreement (main section, rev. 2016) (pdf)
- IATA Master Engine Maintenance Agreement (fillable Annexes) (doc)
- IATA Master Airframe Maintenance Agreement (main section, rev. 2014) (pdf)
- IATA Master Airframe Maintenance Agreement (fillable Annexes) (doc)

### Checklist

➤ Electronic signature & recordkeeping Regulatory Checklist (FAA, T

- Aviation Identification and Authorisation System - White Paper (pdf)
- IATA Paperless Aircraft Operations Conferences (2015-2017)

**GET STARTED**



**&  
Good Luck**

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# Questions



And one last thing...



## Get Involved...

*Industry collaboration is **critical** ...*

Aviation  
Authorities

Standards  
Authorities

Technology  
Providers

OEMs

Lessors

Airlines

MROs

Parts  
Suppliers

Logistics  
Providers

Other  
Groups

- **Whilst at this conference** – come and see me or the IATA team and tell us:

- Your area of involvement, expertise, or interest

- Your view on what needs to be done

- What is important to you in terms of sequencing priorities and key milestone dates

- What the key inter-dependencies are with other stakeholder groups

**& Consider joining a Working Group as an active participant**